Foundations 2: Multinomial-Processing-Tree Modeling
Basic Methods and Recent Advances

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Workshop Day 1: Essentials of MPT Modeling (Thursday, May 2nd, 10:00-17:00)

- 10:00 – 11:15 Basics (Instructor: EE)
  - Introduction to standard MPT models (logic, examples, advantages, limitations)
  - Model development (model construction, paradigm, data structure, identifiability)
  - Parameter estimation (maximum likelihood, minimum χ^2, power-divergence statistics)
  - Model assessment (G^2, Pearson's χ^2, and the PD^{λ} family of goodness-of-fit statistics)
- *Break*
- 11:30 – 12:30 Application I (Instructor: EE & DH)
  - Introduction to multiTree: EQN syntax, data files, batch analysis
  - Practical exercises
  - Order constraints
- *Noon Break*
- 13:30 – 14:30 Advanced features of multiTree (Instructor: EE)
  - Identifiability concepts and checks provided by multiTree
  - A priori and post hoc statistical power analyses
  - Model selection (AIC, BIC, NML, and FIA criterion)
- *Break*
- 14:45 – 15:45 Application II (Instructor: EE & DH)
  - Workflow with multiTree: Developing and testing a new MPT model
  - Using advanced features in multiTree
  - Optional: Testing interactions (EE)
- *Break*
- 16:00 – 17:00 Bayesian hierarchical MPT modeling (Instructor: DH)
  - MPT models & heterogeneity
  - Hierarchical MPT models
  - Bayesian estimation with MCMC sampling
  - Adding continuous covariates

Workshop Day 2: Advances in MPT Modeling (Friday, May 3rd, 9:00-16:00)

- 9:00 – 10:15 Substantive research questions and psychological theory (Instructor: FM)
  - Multinomial modeling of the implicit association test (IAT)
  - Model validation: Testing selective influence
  - Different models for different research questions
- *Break*
- 10:30 – 12:00 Application III (Instructor: DH & FM)
  - Practical exercises on hierarchical MPT modeling using TreeBUGS
  - Basics: Model fitting, convergence, plots, model fit
  - Advanced: Within-/between-subject comparisons, covariates, simulation

- *Noon Break*
- 13:00 – 14:00 Modeling continuous data with discrete bins (Instructor: DH)
    - Modeling response times with histograms (MPT-RT)
    - Short illustration: The MPT-RT approach in practice
- 14:00 – 14:30 Overview of mixture models for continuous data (Instructor: DH)
    - Parametric modeling with generalized processing trees (GPT)
    - Serial process model for response times (RT-MPT)
    - Optional: Short illustration of the R package gpt
- *Break*
- 14:45 - 16:00 Application IV (Instructors: DH, EE, & FM)
    - Questions and answers
    - Developing and testing (new) models suggested by the participants